2012

Prioritizing County-Level Well-Being: Moving Toward Assessment of Gulf Coast Counties Impacted by the Deepwater Horizon Industrial Disaster

NOAA Technical Memorandum

NOS NCCOS 146

This report has been reviewed by the National Ocean Service of the National Oceanic and Atmospheric Administration (NOAA) and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for their use by the United States government.

For more information:
National Centers for Coastal Ocean Science, Hollings Marine Laboratory, 331 Fort Johnson Road, Charleston, SC 29412
http://www.hml.noaa.gov

National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment, 1305 East-West Highway, Silver Spring, MD 20910
http://www.ccma.nos.noaa.gov

Workshop Participants, March 8, 2011, in alphabetical order- Jeffrey Adkins, Scott Boggess, Sam Brody, Lauren Brown, Camille Compton,Eva DiDonato, Maria Dillard, Chris Ellis, Theresa Goedeke, Dan Hahn, Michael E. Jepson, Melissa Kenney, Jan Kucklick, Jarrod Loerzel, David Loomis, Susan Lovelace, Kristen Magis, Percy Pacheco, Linwood Pendleton, Tricia Ryan, Richard Pollnac, Lisa Smith, Heidi Stiller, James Kevin Summers, David LaDon Swann, Jasmine Waddell, Chrissa Waite, Susan White,
Photo credits: All NOAA Hollings Marine Laboratory

Suggested citation for this report-

Lovelace, S., T.L. Goedeke, M. Dillard. 2011. Prioritizing County-Level Well-Being: Moving Toward Assessment of Gulf Coast Counties Impacted by the Deepwater Horizon Industrial Disaster. NOAA Technical Memorandum NOS NCCOS 146, 48 pp.

Prioritizing County-Level Indicators of Human Well-Being: Moving Toward Assessment of Gulf Coast Counties Impacted by the Deep Water Horizon Industrial Disaster

S. Lovelace[a], T.L. Goedeke[b], M. Dillard[a]

[a]JHT, Inc., NOAA National Centers for Coastal Ocean Science, Hollings Marine Laboratory, 331 Fort Johnson Road, Charleston, SC, 29412, USA

[b]NOAA National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment, 1305 East-West Highway, Silver Spring, MD 20910

NOAA Technical Memorandum NOS NCCOS 146

March 2012

Table of Contents

List of Figures

Acknowledgements

The organizers wish to thank the workshop participants for taking time to plan and prepare presentations, for their eager participation in the workshop discussions, and for their continued support. We would also like to thank Tricia Ryan (NOAA CSC) for leading the facilitation process and Chrissa Waite (NOAA CSC), Jan Kucklick (NOAA CSC), and Susan White (NOAA HML) for providing expert facilitation. We thank Camille Compton (NOAA CSC/Budget), Jarrod Loerzel (College of Charleston), and Lauren Brown (College of Charleston) for taking notes and keeping track of all of the workshop output. We are grateful for the assistance of NOAA Hollings Marine Laboratory staff for their support of the travel, hospitality, and IT needs associated with the workshop. The workshop and subsequent project are funded by the National Oceanic and Atmospheric Administration.

Abstract

To develop a portfolio of indicators and measures that could best measure changes in the social, economic, environmental and health dimensions of well-being in coastal counties we convened a group of experts March 8-9, 2011 in Charleston, SC, U.S.A. The region of interest was of the northern Gulf of Mexico, specifically, those coastal counties most impacted during the explosion and subsequent oil spill from the Macondo Prospect wellhead during the summer of 2010. Over the course of the two-day workshop participants moved through presentations and facilitated sessions to identify and prioritize potential indicators and measures deemed most valuable for capturing changes in well-being related to changes in or disruption of ecosystem services. The experts reached consensus on a list of indicators that are now being operationalized by NOAA researchers. The ultimate goal of this research project is to determine whether a meaningful set of social and economic indicators can be developed to document changes in well-being that occur as a result of changes in ecosystem services. The outcomes and outputs from the workshop that is the subject of this report helped us to identify high-quality indicators useful for measuring well-being.

Introduction

Beginning on April 20, 2010 and continuing for nearly three months, oil rushed from the open Macondo Prospect wellhead beneath the surface of the Gulf of Mexico as a result of the Deepwater Horizon explosion. This became the largest marine oil spill in U.S. history. The oil washed ashore to the beaches and marsh areas of Florida, Alabama, Mississippi, and Louisiana. This oil polluted the environment and sullied seafood, water, recreational lands and beautiful views - many of the important ecosystem services that people regularly enjoy from the Gulf. Much attention and research have been focused on assessing the environmental damage caused by the disaster. However, it is also crucial to know how changes in the environment may have caused changes in human well-being and in our society.

To prepare for, and respond to, events like the Deepwater Horizon (DWH) disaster, decision makers, resource managers, and other government officials need information about the social and economic aspects of their communities. Establishing a strategy for monitoring social and economic changes at the county level will allow researchers and public managers to assess the impacts of a variety of potentially harmful events, such as oil spills, hurricanes, floods, and changing environmental conditions (e.g., water quality, changing shorelines, and rising sea levels), to human health and well-being. Additionally, such monitoring can inform the development of tools to predict socioeconomic changes to counties given particular environmental scenarios, identify where resources might be applied to build vibrant and resilient communites and evaluate the success of recovery and restoration efforts undertaken by NOAA.

Therefore, in response to the oil disaster, NOAA is conducting an assessment of changes in county level well-being at given intervals. This research is being accomplished through the collection and analysis of indicators, and the construction of well-being indices. Well-being indices are made up of a collection of relevant indicators that represent a particular dimension of well-being, such as “health” or “economic well-being.” In order to identify those indicators that will both meaningfully and reliably represent the critical components of well-being, we must evaluate a number of possible candidates. Thus, for this project, we have cast a wide net when selecting indicators to investigate. We will later eliminate those indicators that, through analysis, are not meaningful or reliable, culling the list to obtain the best set of indicators for monitoring well-being at the county level. An important aspect of this project is that it utilizes only existing, secondary data. Employing this type of data is cost-effective because the data have already been collected by government agencies or organizations for other purposes, yet can also be used to measure well-being when combined with other data from different sources. Data are largely available for the period of 2000-2009 and will be used to establish the measurement method. These data will also be a cricitical element in establishing a baseline from which changes in well-being for 2010 and 2011 can be measured when the data becomes available.

To launch the project we assembled a group of scientists, policy makers, and environmental managers to identify the best indicators for discerning the linkages

between well-being and ecosystem services. The output of the workshop is the subject of this report.

Well-being and Ecosystem Services

Well-being is utilized as a measure of quality of life in many countries, cities, and localities and is typically broken into components related to economics, environment, basic human needs, and the subjective well-being of people. Many definitions of well-being include the following key components: basic material needs, freedom, health, good social relations, and personal security.

> The NOAA Annual Guidance Memorandum of 2009 stated that "human health, prosperity, and well-being depend upon the health and resilience of natural ecosystems", a sentiment supported by the Millennium Ecosystem Assessment (2005)

A distinction is often made between basic human needs and subjective well-being. Basic human needs are things that are required for survival such as food, water, and shelter. Subjective well being, on the other hand, encompasses more by including those things that are not necessary for survival but are important to a positive emotional and psychological sense of life such as culture and asethetics. Health is important to both. While personal safety such as the absence of acute trauma and disease is a basic need, chronic health issues are important to subjective well-being.

The intrinsic connection between the environment and human well-being is seen throughout the history of civilization such as in pre-historic cave paintings of animal food sources and the location of towns near resource rich areas. More recently, aspects of well-being have been documented in the scientific literature (President's Council of Advisors on Science and Technology 2011). There are questions about whether societies have become decoupled from the environment as technology increases the supply of food and improves our opportunity to combat historical diseases through immunization and sanitary practices (Raudsepp-Hearne et al 2010). However, every day scientists are learning more about the crucial role of the environment in human well-being through the provision of ecosystem services. These services can be thought of as all benefits that humans derive from the ecosystems. For example, food, medicine, recreation, and storm protection are ecosystem services that directly benefit people. Not only do they provide life's basic needs, but changes in their flow impact economic conditions, movement of people, regulation of climate and disease, recreation and cultural opportunities, and security. As a result, such changes have wide-ranging impacts on well-being (Millennium Ecosystem Assessment).

To better understand the linkages between well-being and ecosystem services and, therefore, to be able to predict changes in well-being in relation to changes in the environment, it is important to take a holistic view of coastal systems. Our study will explore how changes in the condition of the Gulf of Mexico and Gulf coastal estuaries impact specific aspects of community well-being. Environmental data will be derived for county level analysis when possible. With disruptions to ecosystem services, such as

after hurricanes and oil spills, policy intervention may be necessary to mitigate consequent reductions to human well-being. More generally, in ocean and coastal management, decisions that alter the ocean and estuaries also alter human relationships to coastal areas in specific ways. As a result, it is important to understand the trade-offs being made with respect to societal benefits.

Changing Ecosystem Services

Humans are dependent upon the natural environment to provide them with the basic necessities of life. Additionally, humans are dependent on the natural environment to sustain lifestyle choices, which may require resources far beyond those necessary to meet basics needs. People derive a range of benefits from the natural environment, some of which are quite obvious and direct, such as food, fiber, and places to live and recreate. Some benefits are more indirect, and perhaps less obvious to the general public, such as the presence of robust ecosystem processes that help to keep populations of disease-causing organisms and parasites in check, thereby reducing their threat to public health. Also, healthy well-functioning oceans and estuaries provide a sink for carbon, extracting it from air and water. The “ends of ecosystem processes,” which humans value socially, economically, or culturally, are called “ecosystem services” (Wallace 2007).

Changing conditions in the natural environment and the corresponding changes to ecosystem components or processes can have a positive or negative impact on the benefits accrued to people. As a result, changes in ecosystem conditions can result in changes to the well-being and quality of life for people who value those benefits the most. When ecosystems that are stressed or compromised fail to provide people with desired benefits, the loss, particularly if the impairment is sustained, will likely become noticeable to people and communities and may serve to reduce well-being. For example, technological disasters that lead to some negative outcome for people or the environment, such as contamination of the natural environment with toxins, chemicals or other contaminants, can greatly reduce or eliminate some ecosystem services of value to people. This may be especially significant for those people who are geographically closest to the disaster. As a result of the Deepwater Horizon oil disaster, for example, ecosystem services were impacted, as evidenced by fishery and beach closures and contamination of water and seafood (Dorfman and Rosselo 2011; Gohlke et al. 2011). This study will help to determine in what ways and to what extent societal indicators changed in response to changes in the disruptions in ecosystem services.

Characterization of Community

In sociological research the term “community” is usually defined by identifying those who are inside versus outside of a social grouping (Putnam 2000). There are a number of approaches to understanding who is a member of a community and who is not. For instance, one might identify the legal, symbolic, physical, or political boundaries of significance (Cohen 1985; Clay and Olson 2008). Often, as with "fishing communities,"

community is identified based on multiple criteria, such as the subjective identity of group members, group-likeness, centrality to place, and socioeconomic integration and dependence (Clay and Olson 2007; Jacob et al 2002). Alternative consideration might be given to who is or is not linked into particular social networks (Putnam 2000) or, as in community development, community management or community health practices, community may refer to a variety of social networks nested into a geographical location (Tropman et al. 2001). For instance those studying community resilience, the ability to recover from the stress of a natural or man-made disaster, may prefer to work with the geographic definition of community (Chandra 2011). While acknowledging the importance of community as a sociological construct, the investigators have chosen to operationalize community in the planning and management sense, relying on established political boundaries at the county and parish level. This is because counties and parishes are:

- are consistent administrative units;
- are associated with a broad range of secondary data;
- correspond to units used in policy making;
- have geospatial dimensions and are, therefore, connected to environmental conditions; and
- can be aggregated up to show trends in regional, state, or multi-state areas.

Oil, Health, and Well-being

Human communities having strong ecologically-based social relationships, meaning communities where social relationships are mediated by natural resource dependencies that are the most vulnerable to disasters. This is because destruction of natural resources disrupts every facet of community life, from health to interpersonal relationships, to economic and community activities and networks (Arata et al. 2000; Dyer et al. 1992; Palinkas et al. 1993; Picou et al. 1992; Picou et al. 2009; Ursano et al. 2007).

There are two frequent types of disasters: natural and technological. Natural disasters are catastrophic events resulting from natural causes, such as tornados, hurricanes, earthquakes, etc., over which man has no control (Shaluf 2007). Technological disasters, however, are man-made disasters that include an occurrence such as a major emission, fire, or explosion resulting from uncontrolled developments in the course of an industrial activity. These disasters can pose serious dangers to humans - immediate or delayed, inside or outside the establishment - as well as to the environment and typically involve one or more dangerous substances (Shaluf 2007).

After the Deepwater Horizon oil rig exploded on April 20, 2010, the rig subsequently sank to the seafloor. A breach in the Macondo well resulted in a voluminous flow of oil into the Gulf of Mexico that lasted for 111 days. Current government estimates report that 4.9 million barrels of oil were released into the environment (Gulf Coast Incident Management Team 2011). Reports also indicate that 1.8 million gallons of chemical dispersants were used in the Gulf to break up the oil flowing from the well (Gulf Coast Incident Management Team 2011).

The disaster created immediate health threats for many workers and community members due to their close proximity to the components of the crude oil. Exposure to such agents are known to cause respiratory, hepatic, renal, endocrine, neurologic, hematologic, or other systemic effects once thresholds of exposure are exceeded (Center for Disease Control and Prevention 2005, Environmental Protection Agency, 2007). For example, Benzene and polycyclic aromatic hydrocarbons (PAH's) are the predominant carcinogens of concern that comprise crude oil and are frequently the result of offshore burns (Goldstein and Osofsky 2011). The National Institute of Environmental Health Sciences (NIEHS) is conducting an open-ended study of workers and is focused on specific endpoints including respiratory and neurological outcomes (Schimidt 2011).

Goldstein and Osofsky (2011) point out that there are a number of mental health effects that community members may experience from social and economic disruptions and call attention to the fact that the "ecologic, economic, and health effects of the spill are closely interconnected" (p. 1334). All of these impacts contribute to changes in the well-being of communities. In addition to health effects, technological disasters can have profound psychological and social impacts. Unlike natural disasters, which are typically perceived as "acts of God" and not "preventable," (Freudenburg 1992), industrial or technological disasters pose an added challenge to the recovery of compromised communities for several reasons.

Foremost, industrial disasters frequently involve the spill or release of toxic chemicals or other substances that result in an immediate threat to the health of people and ecosystems. According to Gill and Picou (1998, 796), the outcomes of industrial disasters challenge a community's "fundamental expectations regarding their relationship with nature." Commonplace are community uncertainties about the toxicity of local ecosystems or the potential for full ecological recovery. Lack of strategic communications by and among agencies adds to community concerns (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling 2011, Browning and Shetler 1992)). Concerns about the safety of living around, recreating in, or consuming local natural resources from damaged ecosystems plague communities from the onset of a spill to long after public or governmental attention is withdrawn from the event (Button 1995; Fall et al. 2001; Freudenberg 1997; Palinkas et al. 1993; Rodin et al. 1992). For example, years after clean-up of the Exxon Valdez industrial disaster, the spill continued to disrupt local use of natural resources because of "anxieties, fears, and confusion about the potential toxicity of subsistence foods" (Palinkas et al. 1993, 7). There can also be negative effects to oil-impacted communities as a result of the influx

of “outsiders,” such as workers or volunteers, who come into the community during the clean-up and recovery phases. For small, insular communities, in particular, this rapid change in the structure and face of their community can be a significant source of stress and conflict (Palinkas et al. 1993; Rodin et al. 1992; Ursano et al. 2007).

Technological disasters are unique in their disruption of the social structure of local communities because of the social anger, discord, and conflict that typically characterizes these events (Palinkas et al. 1993; Ursano et al. 2007). In the case of Exxon Valdez oil spill, for example, the clean-up phase was as detrimental to the health and well-being of affected residents as the disaster itself because of the real and perceived inequities in the disbursement of compensation and clean-up contracts both within and between local communities (Palinkas et al. 1993; Rodin et al. 1992). Unlike natural disasters, with industrial disasters community recovery is hampered by the “corrosive” nature of the contested, adversarial legal processes that are implemented to assess damages, compensate victims, etc. (Picou et al. 2004). Such processes of determining culpability, liability, and compensation are frequently slow and commonly perceived as inequitable or unjust (Picou et al 2004). These circumstances and a plethora of other factors related to technological disasters lead to “chronic community stress” which takes a toll on the health and well-being of affected communities and residents over the long-term and hinders their ability to recover (Gill & Picou 1998). For example, Palinkas et al. (1993) reported significant levels in generalized anxiety disorders, depression, substance abuse, and domestic violence in communities that had been oiled by the Exxon Valdez spill one year after the spill had occurred.

A Workshop to Develop Common Indicators

As the Deepwater Horizon disaster unfolded, the immediate consequences to Gulf residents and visitors were initially documented by the media. In addition to providing the immediate response functions to protect people and natural resources and to assess the damage of the spill, researchers in government agencies and academia started to think about how to monitor the response and recovery of the coastal ecosystem. Gaining a better understanding of the consequences of the spill will allow managers to develop interventions to improve the outcome of this particular event and also to predict changes so that interventions could be rapidly deployed to aid in recovery for future events.

Although some government agencies do monitor different aspects of social well-being, such as public health and economic conditions, measuring the general well-being of people is a relatively new endeavor in government research, particularly within the US. There are several notable exceptions including the Canadian Index of Well-being (2011) and the Bhutan’s Gross National Happiness assessment (Ura 2008). Because it is new, there are no standardized measures that might be collected by different government agencies, and little discussion of common scales and sharing of resources exists. It is important that government researchers use common measures when appropriate to leverage work in a cost efficient and resource effective manner. One aim of this

workshop was to gather government scientists and managers who collect, provide, and use data to discuss well-being indicators and measures that might provide synergy.

Goals and Objectives of the Workshop

The workshop was convened at the Hollings Marine Laboratory on March 8-9, 2011. The overall aim was to assess and develop well-being indicators and measures that include mental and physical health and components of well-being that are appropriate to the entire Gulf coast area, can be used across agencies, and may be aggregated and disaggregated to appropriate scales for different projects. To accomplish this, we brought together agency and academic scientists who have theoretical and methodological expertise in indicator development, well-being studies, and the sociological dimensions of natural resources and institutions. (For a complete list of participants, see Appendix A.) Specific objectives included:

1. Workshop participants are informed about the well-being indicator and index work being conducted by others.

2. Workshop participants will identify and describe a baseline or common set of indicators of well-being that are reflected by changing ecosystem services.

3. Participants will identify and describe the most accurate and efficient measures of indicators.

4. Workshop participants will conceptualize an integrated design of indicators needed for development of a well-being index and draft a framework for an index to assess well-being in the Gulf of Mexico.

5. Workshop participants will consider, if appropriate, using the identified indicators in their research or activities.

Workshop Structure and Content

The structure of the workshop was a combination of presentations, small and large group discussions, and conceptual activities. Assignment to small groups was purposeful to balance participation of different social science disciplines, policy makers, managers, and Gulf coast residents in each group. This workshop structure was designed to meet the needs of investigators with the Gulf well-being research project, as well as to supply useful outputs for the research community. A secondary goal was to convene government scientists and managers to consider indicators and measures that are mutually beneficial.

In collaboration with project investigators, the workshop was professionally planned and facilitated by the NOAA Coastal Services Center. The complete agenda for the workshop can be found in Appendix B. Prior to the workshop, participants were asked to

submit research articles and any other supporting materials that they authored or considered seminal, and that related directly to well-being research and indicator development. These documents were consolidated and given to each participant along with other workshop materials.

Once the workshop was convened, the organizers provided an overview of the workshop agenda, including the goals, objectives, and expectations. Workshop participants agreed on ground rules for interaction as well as working definitions of common terminology to be used for the duration of the workshop (See Appendix C). For example, for the purposes of the workshop the concept “indicator” was defined in this way:

> *Social indicators should be an aid in describing changing social conditions and should have an explanatory or theoretical function; e.g., access to recreational opportunities may be an indicator, whereas the number of parks within a county may serve as a measure of this indicator. The idea of social indicators is closely linked with the idea of monitoring social change in order to introduce a policy intervention, when possible. (Duncan 1974)*

Prior to the event, seven participants were asked by workshop organizers to prepare and provide a presentation to the group. A diverse set of presenters were selected to reflect the range of work being undertaken by academic and government researchers in relation to well-being and indicator/index development. Each presenter was asked to cover:

- an overview of their recent research, including experience with indicators and indices of well-being, resilience, vulnerability, community capacity, and social capital;
- an overview of significant research findings, models/frameworks, or preliminary research results;
- thoughts on and/or experience with the use of indicators at the local level (defined as either county or community); and
- thoughts on linking ecosystem services or the natural environment to indicators of well-being (or related concepts) and, if relevant, examples from their own work.

A number of themes emerged from the presentations, described below under four general categories.

> Variables, Indicators, and Measures—Presenters detailed the types of variables, whether described as indicators or measures, which have been previously employed to assess well-being, resiliency, risk, or vulnerability. The variables described were associated with a variety of research topics and questions related to natural disasters, natural resource management, regulatory change, and ecological change.

Sources and Availability of Data—Presenters provided information on the many sources of existing, secondary data that are available. Additionally, they offered insight into the nature of these datasets in terms of variables offered, scale, availability, etc. Finally, presenters described various ongoing efforts for collecting primary data to assess well-being in some fashion.

Conceptual and Statistical Models—Presenters displayed and described a number of statistical models that have been used to investigate a variety of research questions focused on well-being. Additionally, presenters provided a number of heuristic and conceptual models, some of which demonstrated possible linkages between human well-being and ecological factors.

Strengths, Weaknesses, Challenges—Presenters provided insight into the strengths, weaknesses, and challenges of the various approaches for operationalizing well-being, defining indicators and measures, as well as for deciding which level, scale, or data are appropriate. Presenters offered a variety of cautions and caveats for working with particular types of data or datasets.

During the second half of the first day, participants working in small and large group settings identified baseline indicators that met all of the criteria that they defined as necessary for good indicators. A list of these criteria is provided in Figure 1.

Criteria for Indicator Development

- Simple
- Few
- Easily collected
- Understandable
- Comparable
- Responsive to change
- Past data is available
- Measureable
- Able to identify change

Figure 1. Criteria for Indicator Selection

Working from a straw man list developed by the organizers, participants developed a large list of best indicators that they later narrowed to a priority set. Participants were able to sort the indicators that tracked well together into three bins: basic needs, subjective well-being, and mixed environment and economic indicators.

During the second day, participants reviewed their initial work and had the opportunity to add indicators that, upon reflection, had been omitted or cut during the previous days' discussions. Small groups were asked to review their indicators and identify measures that could directly or indirectly quantify the indicator. At the same time, participants recorded information describing peer-reviewed support, current uses of indicators and measures, and potential data sources for measures.

Later in the second day, small group participants were asked to think conceptually about and sketch out the linkages between their indicators and measures and those ecosystem services impacted by the oil disaster.

The discussions and outputs of the small group activities are summarized below. Indicators were randomly assigned to each group. You will see that there was much conceptual overlap between the groups as each group was allowed to interpret the indicators as they worked. It is important to note, however, that these conceptual frameworks were developed differently and, in all three cases, were not reviewed and refined by the collective group due to time constraints.



Basic needs

The basic needs group honed the results of the large group brainstorming session into 12 indicators:

- education, e.g., high school dropout rates
- effective government (includes planning and management quality), e.g., comprehensive & emergency management planning
- civil society, e.g., membership in organizations
- housing, e.g., occupancy rates
- access to critical services, e.g. medical, welfare
- economic security, e.g., employment, personal income
- social cohesion (size of social network, family and friends, participation and trust), e.g., number of churches
- health (physical and mental), e.g., doctor visits
- population (including migration)
- food and water, e.g., water quality, nutrition rates
- equity (equal access to benefits within the community), e.g., population living near factories
- safety (security of person and property), e.g., crime rate, disaster prevalence

Each of these 12 indicators were discussed within the context of (1) whether the indicator has been used by others and in what context, (2) scale of use, (3) benefits and drawbacks of use, and (4) methods of measurement for the indicator. To continue, the three most highly ranked priority indicators were chosen for further development and conceptual mapping. These indicators were health, economic security, and safety. Later the group decided that it was also very important to include social cohesion. The

conceptual framework produced by this group is depicted in Figure 2, below. Participants drew lines for recording linkages between indicators (represented by solid lines) and potential measures (represented by dotted lines). A list of environmental resources impacted by the oil disaster and linked to well-being was assembled.

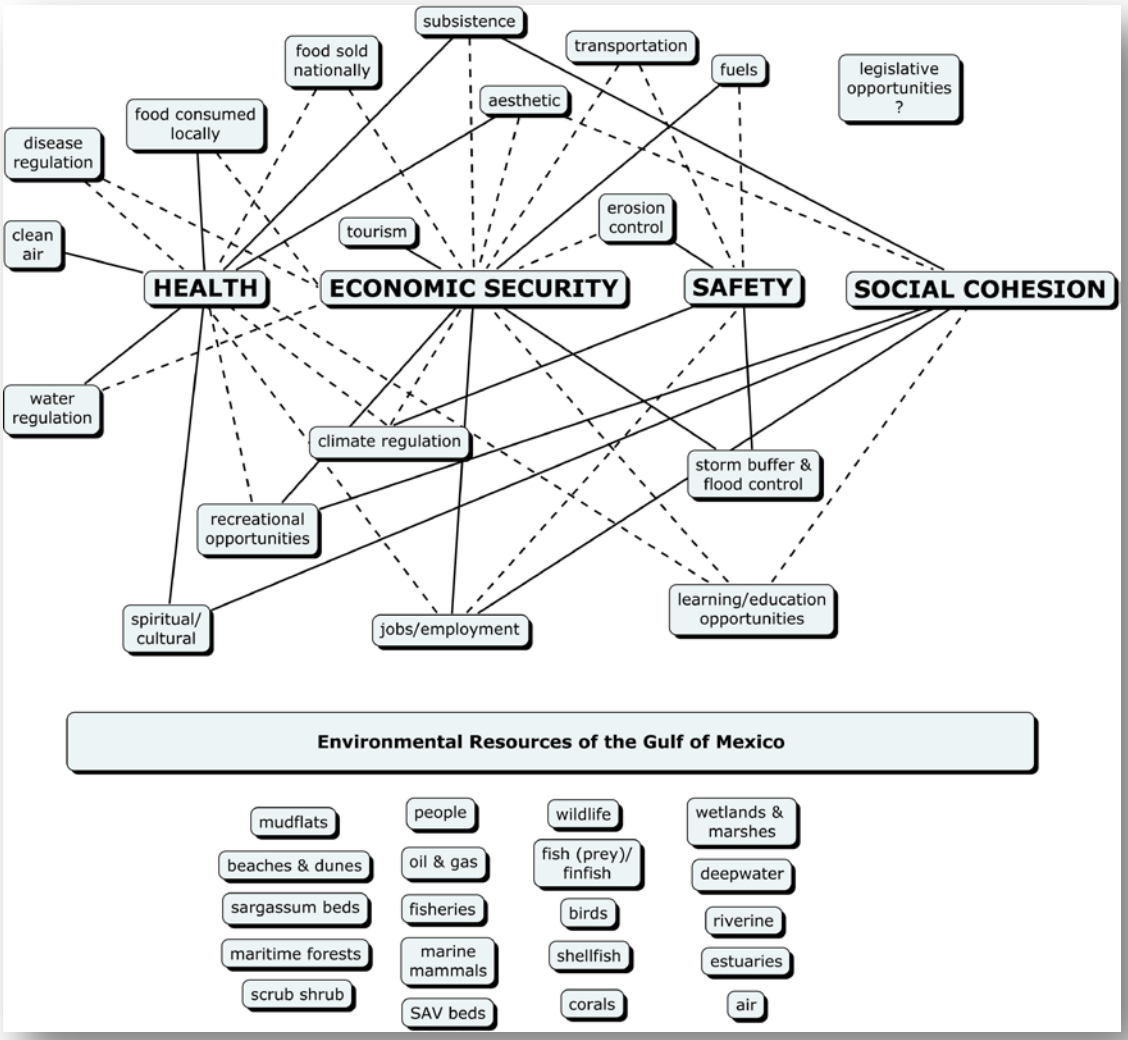


Figure 2. Conceptual Map with Basic Needs Indicators

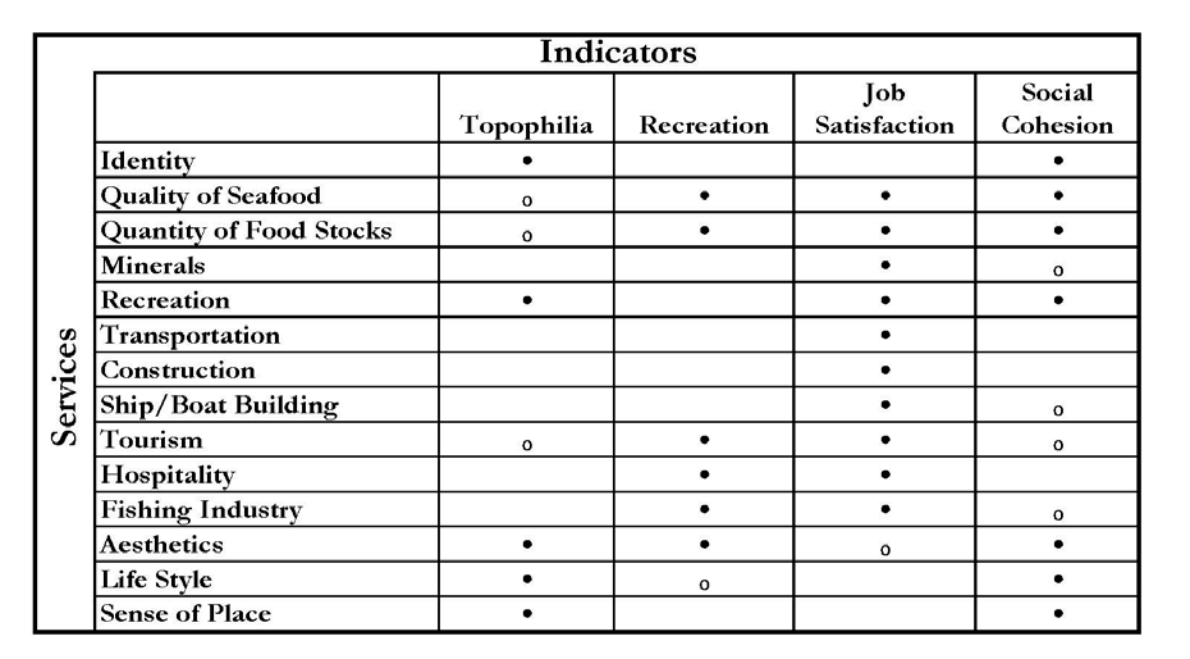
Subjective well-being

The group responsible for exploring subjective well-being selected 8 indicators from the large group brainstorm:

- cultural opportunities, e.g., presence of museums
- topophilia, e.g., place-based pride, ancestry

- recreational places, e.g., parks
- recreational activity, e.g., boating
- social diversity, e.g., race, ethnicity
- trust, e.g., trust in political leaders
- job satisfaction, e.g., feeling challenged by work, enjoying your work
- social cohesion, e.g., number of churches, involvement in local community

Participants discussed each indicator and identified multiple measures for each. These measures were grouped and edited for four major indicators: topophilia, recreation, job satisfaction, and social cohesion (see Figure 3). In this conceptual framework, a solid circle represents a direct connection between an indicator and ecosystem service, while an open circle represents an indirect connection.



Services	Topophilia	Recreation	Job Satisfaction	Social Cohesion
Identity	•			•
Quality of Seafood	o	•	•	•
Quantity of Food Stocks	o	•	•	•
Minerals			•	o
Recreation	•		•	•
Transportation			•	
Construction			•	
Ship/Boat Building			•	o
Tourism	o	•	•	o
Hospitality		•	•	
Fishing Industry		•	•	o
Aesthetics	•	•	o	•
Life Style	•	o		•
Sense of Place	•			•

Figure 3. Conceptual Diagram with Subjective Well-being Indicators

Mixed environment and economic indicators

The mixed environment/economics group discussed each of the 37 indicators that the large group produced during the brainstorming session. From this list they selected 10 indicators that they felt were most important. The groups discussed the benefits and problems associated with each indicator based on the original criteria as well as measurement availability. Participants chose the following indicators:

- property value, e.g., median home values
- income (poverty), e.g., median household income

- park lands, e.g., acres
- water quality/quantity
- employment security, e.g., employment rate
- tax revenue
- air quality
- faith-based groups, unions, neighborhood associations, e.g., organizations per capita
- degree of participation in governance, e.g.,voter turnout
- beach quality

This group binned their priority indicators into 5 groups: income, recreation, health and nutrition, occupation structure, degree of participation, and wealth and property value. They also produced a list of measures for each indicator. All of the indicators were mapped with lines to show linkages between the indicators and ecosystem services

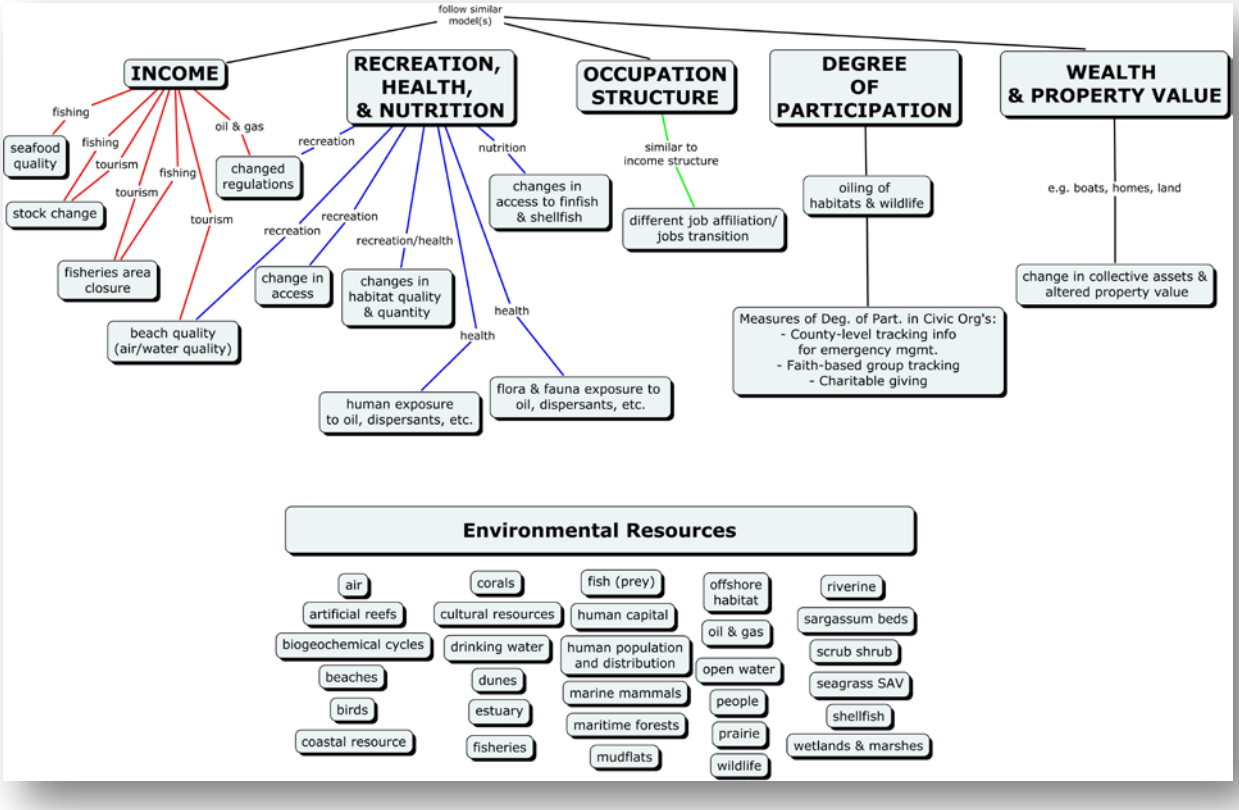


Figure 4. Conceptual Map with Mixed Environmental and Economic Indicators

provided by the Gulf of Mexico and its estuaries (see Figure 4).

Output Summary

During the workshop, participants identified over 200 indicators and articulated approximately 100 links between environmental change and community well-being through the production of three conceptual frameworks conveying the interaction

between well-being and environmental conditions/ecosystem services. The result of the discussions was a list of 25 priority indicators in five categories, or domains. Other indicators were eliminated, due either to being identified as lower in priority, difficult to measure, or inappropriate for the county level of analysis.

In a follow up to the workshop an additional modified Delphi process was employed to validate the workshop findings and further prioritize the important indicators. In this process the workshop participants, considered to be an expert panel, were presented with another round, or opportunity to prioritize the workshop output. They were asked to rate their level of agreement that the indicator should be a part of a measure of community well-being on a scale from 1 to 5, with 5 being "strongly agree". Of the 25 invited responses, 14 participants provided their rankings.

Indicators ranked by workshop participants as the most important during post-workshop evaluation are seen in Figure 5, below. The table displays the top three indicators within each domain along with the results of post-workshop ranking by participants. The indicators with an asterisk are the items most highly ranked during the workshop; those in bold are the most highly ranked post-workshop. In post-workshop rankings, topophilia was not included as a priority indicator, primarily due to the difficulty of operationalizing and measuring this type of indicator with secondary data. The current order suggests only a slight shift in participants' rank following the workshop.

Domain	Indicator	Mode	Mean	SD
Basic Needs				
	Health*	**5**	**4.8**	**0.38**
	Safety*	**5**	**4.6**	**0.65**
	Economic Security*	**5**	**4.5**	**0.66**
Subjective				
	Social cohesion*	**5**	**4.4**	**0.65**
	Job satisfaction*	**4**	**4.1**	**1.04**
	Trust	**4**	**3.8**	**0.73**
Social Structure				
	Civil society	**4**	**3.7**	**0.49**
	Equity	**4**	**3.6**	**0.79**
	Effective governance	**3**	**3.5**	**0.90**
Environment				
	Environmental quality/ quantity*	**5**	**4.5**	**0.66**
	Recreational places	**4**	**4.0**	**0.58**
	Changes in land use	**3**	**3.8**	**0.90**
Economic				

	Income*	**5**	**4.5**	**0.66**
	Wealth	**4**	**3.7**	**1.03**
	Occupation structure*	**3**	**3.6**	**1.04**

Notes:
Asterisk=highest ranked during workshop; Bold=highest ranked post-workshop; SD=standard deviation

Figure 5. Reviewed List of Priorities

This iterative evaluation of indicators relied on participant involvement during and after the workshop. Moreover, participant engagement has continued since the conclusion of workshop activities in the following ways:

- Project investigators were invited to take part in the American Community Survey Federal User Data Workshop along with representatives from seven departments of the federal government. The workshop was part of the ongoing effort to better match user needs with data collected and produced by the US Census Bureau and proved useful to understanding how the data is most appropriately used.

- Following the release of the initial *Economics: National Ocean Watch* (ENOW) data set and discussions with the project investigators, NOAA's Coastal Services Center agreed to extend data collection to include the years needed for the northern Gulf of Mexico collection. The data collection and analysis requires reaggregation of existing data from the Bureau of Labor Statistics and Bureau of Economic Analysis to describe the six economic sectors that depend on the oceans and Great Lakes. The data is produced at the county level and will be an important component of the economic dimension of well-being.

- The investigators have continued collaborating with the National Marine Fisheries Service, including close ties with both the Southeast and Northeast Regional Offices, and have developed into an informal "Indicators Work Group" focused on developing and incorporating social and economic indicators into NOAA's work. The projects represented by the members of the work group address multiple scales and geographies, but aim to be complementary in the types of data collected and analyzed. The work group has now expanded to include the participation from the National Environmental Satellite, Data, and Information Service's National Climatic Data Center. The work group is preparing collaborative presentations and workshops for the coming year.

- In partnership with the Ecosystems Services Research Program of the Environmental Protection Agency, research relating well-being indicators and measures to ecosystem services and environmental health began. The partnership with the EPA has continued throughout the current project.

Researchers keep up to date on project progress as the EPA program transitions to the Sustainable and Healthy Communities Program.

- Additionally, one project investigator attended the annual Deepwater Horizon Principal Investigators Workshop in November 2011 in order to integrate this work on community well-being into the larger study of the Northern Gulf area prompted by the oil spill.

In evaluating the content and process of the workshop, all 14 of the responding participants thought that their expectations for the workshop were met. Additional information from this assessment can be found in Appendix E.

Next Steps: Assessing Well-being in GOM

Researchers with NOAA's National Centers for Coastal and Ocean Science used the results of this workshop to move forward with the planning and execution of their research project to determine whether a meaningful set of social and economic indicators, or some form of index or scorecard, can be developed to document changes in well-being that occur as a result of changes in ecosystem services. Fully developed indicators will allow NOAA or other government entities to better evaluate the relative condition of coastal communities, as well as to assess their degree of resiliency to significant social, economic, and ecological changes over time. Information about which forms of social disruption accompany acute changes to coastal environments, such as hurricanes and major oil disasters, or chronic impacts to the environment caused by human activities may provide officials the opportunity to anticipate and prepare for response.

Indicator Selection

In a review of existing indices of complex concepts like well-being, quality of life, and human development created for a variety of scales, the domains and indicators prioritized by the workshop participants were determined to align well. The review of existing indices, in conjunction with review of literature and data availability, has contributed to the selection of measures that will be used to operationalize each indicator. Additionally, the indicators and measures were carefully reviewed to ensure that they would be meaningful at the county level. Some indicators, like job satisfaction, were highly prioritized by the experts, but would not be measurable or meaningful for an entire county and were limited by the use of secondary data.

To capture each indicator, measures were selected through the use of the workshop outputs, as well as discussions of the project team. Throughout the process of data collection, additional measures have been added and removed due to issues of availability, comparability, and importance. The inclusion of multiple measures that get to the same indicators may improve the function of the indicators over time, space, and

scales. From this portfolio of high-quality indicators we plan to develop a suite of indices that together will serve as a tool to measure the critical dimensions of well-being. The indicators may or may not be integrated into a single overarching “well-being index.”

Research Strategy

The study will employ a longitudinal research design to examine changes in dimensions of well-being over a 10 year period using secondary data, meaning those regularly collected by federal, state, and local agencies for other purposes. Data on environmental conditions, such as contaminant levels, will be used to assess the dynamic relationship between the ecosystem services that people regularly enjoyed prior to the disaster and community well-being. Collectively, these data will be used to establish indicators of public health, well-being, and environmental health in coastal counties. Data will be analyzed to measure change over time. Using statistical techniques such as regression analysis and structural modeling, we will examine relationships between various aspects of well-being and changing environmental conditions. With a longitudinal study design, this study allows for observations of change in Gulf coast communities over an extended period of time. The data will contribute to predictive models to assess future change. Needed data are largely available for the period of 2000-2009 and will be used to establish a baseline and a method by which changes in well-being for 2010 and beyond can be measured when the data becomes available.

Projected Outcomes

The outputs of this study include indices to measure dimensions of well-being, data compiled from secondary sources to support future information needs and evaluation, methodological approaches for ongoing monitoring, and predictive models. These tools represent an effective means of informing policy, specifically response planning and decision-making. Among the goals of this research for coastal resource management agencies is to develop comprehensive indices that are reflective of environmental health and ecosystem service provisions to quality of life and well-being. This research should also provide a method for examining the contributions of social and economic conditions to environmental health.

The workshop itself was an important output of the project as it was an opportunity to stimulate movement toward a standard list of human dimensions/social and economic indicators that all government agencies will use to assess the human dimensions of numerous issues, environmental and otherwise. The indicators prioritized during the workshop reflected the critical thinking of a group of experts with particular emphasis on the scope of the specific project as well as an eye to effective indicators for future research needs. The development of a suite of indicators and measures of well-being that can be consistently collected through secondary data across geographies, with an

emphasis on long term monitoring, has advantages to future work on a diverse set of issues.

The project will culminate with the production of a database that fulfills two distinct purposes. The database itself will be tailored to sharing this wealth of secondary data with researchers and others (e.g., academics, students, other social scientists within federal agencies) who have experience using query based data systems. Additionally, for coastal managers and decision makers, the data will be delivered concisely and graphically through an online interface. In order to support resilient coastal communities, the ultimate goal will be to anticipate and prepare for the types of social disruption most likely to accompany acute changes to coastal environments, such as hurricanes and major oil disasters, while also addressing chronic impacts to the environment caused by human activities.

References

Arata, Catalina M., J. Steven Picou, G. David Johnson, and T. Scott McNally. 2000. "Coping with Technological Disaster: An Application of the Conservation of Resources Model to the Exxon Valdez Oil Spill." Journal of Traumatic Stress 13:23-39.

Browning, Larry D. and Judy C. Shetler. 1992. "Communication in Crisis, Communication in Recovery: A Postmodern Commentary on the Exxon Valdez Disaster." *International Journal of Mass Emergencies and Disasters* 10:477-498.

Button, Gregory V. 1995. "What You Don't Know Can't Hurt You": The Right to Know and the Shetland Island Oil Spill." Human Ecology 23:241-257.

Canadian Index of Wellbeing. 2011. How are Canadians Really Doing? Highlights: Canadian Index of Wellbeing 1.0. Waterloo, ON: Canadian Index of Wellbeing and University of Waterloo.

Chandra, Anitia, Joie Acosta, Stefanie Stern, Lori Uscher-Pines, Malcolm V. Williams, Douglas Yeung, Jeffrey Garnett, Lisa S. Meredith. 2011. Building Community Resilience to Diasters, A Way Forward to Enhance National Health Security. Rand Corporation. Santa Monica,California, USA

Clay, Patricia M. and Julia Olson. 2007. Defining fishing communities: Issues in theory and practice. NAPA Bulletin 28: 27-42.

Cohen, Anthony P. 2004. The Symbolic Construction of Community. Routledge: London.

Dorfman, Mark and Kirsten Sinclair Rosselo. 2011. "Testing the Waters 2011: A Guide to Water Quality at Vacation Beaches." Natural Resources Defense Council.

Duncan, Otis Dudley. 1974. "Developing Social Indicators." Proc. Nat. Acad. Sci. USA 71:5096-5102.

Dyer, Christopher L., Duane A. Gill, and J. Steven Picou. 1992. "Social Disruption and the Valdez Oil Spill: Alaskan Natives in a Natural Resource Community." Sociological Spectrum 12:105-126.

Environmental Protection Agency.August 29, 2005. Facts about Benzene. Center for Disease Control and Prevention. Retrieved June 21, 2011, from http://www.bt.cdc.gov/agent/benzene/basics/facts.asp

Environmental Protection Agency. November 06, 2007. Toluene. U.S. Environmental Protection Agency. Retrieved June 21, 2011, from http://www.epa.gov/ttnatw01/hlthef/toluene.html

Fall, James A., Rita Miraglia, William Simeone, Charles J. Utermohle, and Robert J. Wolfe. 2001. Long-term Consequences of the Exxon Valdez Oil Spill for Coastal Communities of Southcentral Alaska. Technical Paper No. 264. Juneau, AK: Division of Subsistence, Alaska Department of Fish and Game.

Freudenburg, William R. and Susan K. Pastor. 1992. "Public Responses to Technological Risks: Toward a Sociological Perspective." The Sociological Quarterly 33:389-412.

Gill, Duane A. and J. Steven Picou. 1998. "Technological disaster and chronic community stress." Society & Natural Resources 11:795-815.

Gohlke, Julia M, Dzigbodi Doke, Meghan Tipre, Mark Leader, and Timothy Fitzgerald. 2011. "A Review of Seafood Safety after the Deepwater Horizon Blowout." Environmental Health Perspectives. 1998.

Goldstein, B. D., H. J. Osofsky, et al. (2011). "The Gulf Oil Spill." The New England Journal of Medicine. 364: 1334-1348.

Jacob, Steve, Michael Jepson, Carlton Pomeroy David Mulkey, Chuck Adams, and Suzanna Smith. 2002. Identifying Fishing-dependent communities: development and confirmation of a protocol. Report to the National Marine Fisheries Service, Southeast Region. Department of Family, Youth and Community Sciences, University of Florida: Gainesville, FL.

Millennium Ecosystem Assessment (MEA). 2005. "Ecosystems and Human Well-being: Health Synthesis."

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. (2011). Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling**:** 1-381.

NOAA Annual Guidance Memorandum, August 5, 2009. Available online: http://www.ppi.noaa.gov/PPI_Capabilities/Documents/AGMs/AGM_08-2009.pdf.

Palinkas, Lawerence A., Michael A. Downs, John S. Petterson, and John Russell. 1993. "Social, Cultural, and Psychological Impacts of the Exxon Valdez Oil Spill." Human Organization 52:1-13.

Picou, J. Steven, Cecelia Formichella, Brent K. Marshall, and Catalina Arata. 2009. "Community Impacts of the Exxon Valdez Oil Spill: A Synthesis and Elaboration of Social Science Research." Pp. 279-310 in Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska, edited by S. R. Braund and J. Kruse. Anchorage, Alaska: Stephen R. Braund & Associated.

Picou, J. Steven, Duane A. Gill, Christopher L. Dyer, and Evans W. Curry. 1992. "Disruption and Stress in an Alaskan Fishing Community: Initial and Continuing Impacts of the Exxon Valdez Oil Spill." Industrial Crisis Quarterly 6:235-257.

President's Council of Advisors onScience and Technology (PCAST). 2011. "Report to the President, Sustaining Environmental Capital: Protecting Society and the Economy."

Putnam, Roger D. 2000. Bowling Alone: The collapse and revival of American community. Simon & Schuster: New York.

Raudsepp-Hearne, C., G. D. Peterson, et al. (2010). "Untangling the Environmentalist's Paradox: Why Is Human Well-Being Increasing as Ecosystem Services Degrade?" Bioscience 60(8): 576-589.

Rodin, Mari, Michael Downs, John Petterson, and John Russell. 1992. "Community impacts resulting from the Exxon Valdez oil spill." Industrial Crisis Quarterly 6:219-234.

Tropman, John E.,John Erlich and Jack Rothman. 2001. Tactics & Techniques of Community Intervention.Itasca, Il: F.E. Peacock.

United Nations Environmental Programme (UNEP). 2006. "Marine and Coastal Ecosystems and Human Well-being: A synthesis report based on the findings of the Millennium Ecosystem Assessment." United Nations Environment Programme.

Ura, Karma. 2008. Explanation of GNH Index. Gross National Happiness. The Centre for BhutanStudies http://www.grossnationalhappiness.com/gnhIndex/intruductionGNH.aspx#_ftn1 (last visited March 31, 2010)

Ursano, Robert J., Carol S. Fullerton, Lars Weisaeth, and Beverley Raphael. 2007. "Individual and community responses to disasters." Pp. 3-26 in Textbook of Disaster

Psychiatry, edited by R. J. Ursano, C. S. Fullerton, L. Weisaeth, and B. Raphael: Cambridge University Press.

Wallace, Ken J. 2007. "Classification of ecosystem services: Problems and solutions." Biological Conservation 139:235-246.

Appendix A: Workshop Participants

Indicators of Community Well-being
Gulf Coast Counties in the Wake of the Deep Water Horizon Industrial Disaster
Workshop Participants March 8-9, 2011

US Census Bureau
- Scott Boggess, American Community Survey

Environmental Protection Agency
- Lisa Smith, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Breeze Laboratory, Gulf Ecology Division
- James Kevin Summers, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Breeze Laboratory, Gulf Ecology Division

National Park Service
- Eva DiDonato, Water Resources Division, Ocean and Coastal Resources Branch

State Agencies
- David LaDon Swann, Mississippi-Alabama Sea Grant Consortium, Auburn University Marine Extension and Research Center

Local Government
- Dan Hahn, Santa Rosa County, Florida, Division of Emergency Management

Academic Institutions
- Sam Brody, Texas A&M University, Departments of Marine Sciences at Galveston and Landscape Architecture and Urban Planning at College Station
- David Loomis, East Carolina University, Institute for Coastal Science and Policy
- Kristen Magis, Leadership Institute Portland State University, Hatfield School of Government
- Richard Pollnac, University of Rhode Island, Department of Marine Affairs and Anthropology
- Jasmine Waddell, Brandeis University, Heller School for Social Policy and Management (formerly Oxfam America)
- Rick Weil, Louisiana State University, Department of Sociology

National Oceanic and Atmospheric Administration
- Jeffrey Adkins, National Ocean Service, Coastal Services Center

- Maria Dillard, JHT, Inc., National Ocean Service, National Centers for Coastal Ocean Science, Hollings Marine Laboratory/Center for Human Health Risk
- Chris Ellis, National Ocean Service, Coastal Services Center
- Theresa Goedeke, National Ocean Service, National Centers for Coastal Ocean Science, Center for Monitoring and Assessment
- Michael E. Jepson, National Marine Fisheries, Sustainable Fisheries/Social Science Branch
- Melissa Kenney, AAAS Fellow, Climate Program Office
- Susan Lovelace, JHT, Inc., National Ocean Service, National Centers for Coastal Ocean Science, Hollings Marine Laboratory/Center for Human Health Risk
- Percy Pacheco, National Ocean Service, Special Projects Office
- Linwood Pendleton, Chief Economist
- Heidi Stiller, National Ocean Service, Coastal Services Center

Facilitators:

- Tricia Ryan (lead), National Ocean Service, Coastal Services Center
- Jan Kuklick, National Ocean Service, Coastal Services Center
- Chrissa Waite, National Ocean Service, Coastal Services Center
- Susan White, National Ocean Service, National Centers for Coastal Ocean Science, Hollings Marine Laboratory/Center for Human Health Risk

Note Takers:

- Lauren Brown, College of Charleston
- Camille Compton, NOAA, Coastal Services Center, Office of Management and Budget
- Jarrod Loerzel, College of Charleston

Appendix B: Workshop Agenda

Indicators of Community Well-being Workshop
Gulf Coast Counties in the Wake of the Deepwater Horizon Industrial Disaster

Workshop Agenda
Tuesday, March 8 - Wednesday, March 9, 2011

~ GOAL ~

The two-day workshop will assess and develop well-being indicators and measures that span the range of health and well-being domains, are appropriate to the entire Gulf coast area, can be used across agencies and may be aggregated and disaggregated to appropriate scales for different projects.

~ OBJECTIVES~

1. Workshop participants are informed about the well-being indicator and index work being conducted by others.

2. Workshop participants will identify and describe a baseline or common set of indicators of well-being that are reflected by changing ecosystem services.

3. Participants will identify and describe the most accurate and efficient measures of indicators.

4. Workshop participants will conceptualize an integrated design of indicators needed for development of a well-being index and draft a framework for an index to assess well-being in the Gulf of Mexico.

5. Workshop participants will consider, if appropriate, using the identified indicators in their research or activities.

~ AGENDA~

Tuesday	ACTIVITIES and OBJECTIVES
8:00	**Tuesday , March 8, 2011** **Please meet in lobby of Fulton Lane Inn to split into available vehicles. Travel to HML**

8:00 - 8:30	**1. Check-in, Coffee & Tea-** Participants get caffeinated ☺
8:30 - 10:00	**2. Welcome and Purpose of Workshop** • Welcome and overview of workshop. Participants share information and research. Welcome • Hollings Marine Laboratory-- Susan White, Director • NOAA Social Sciences-- Linwood Pendleton, Chief Economist • Housekeeping Details • Overview of Project, Health and Well-being in Coastal Counties: Impact and Resiliency in the Wake of the Deepwater Horizon Industrial-Environmental Disaster – Theresa Goedeke • Workshop Objectives and introduction of facilitator—Susan Lovelace • Introduction of participants-all **Participant Presentations (10 minutes each)** • Heidi Stiller • LaDon Swan • Jasmine Waddell • Kevin Summers/Lisa Smith
10:00 – 10:15	**BREAK**
10:15 - 12:15	3. Continue Participant Presentations (10 minutes each) • Scott Boggess • Sam Brody • David Loomis • Michael E. Jepson • Richard Pollnac • Rick Weil • Kristen Magis • Dan Hahn • Melissa Kenney
12:15 – 1:15	LUNCH – Catered On-Site

1:15 – 2:45	4. Large Group -- Indicators • Identify and describe categories for indicators of well-being • Develop criteria for indicators and measures
2:45 – 3:15	**BREAK**
3:15 – 4:30	5. Small Breakout Groups: **Objective:** Workshop constituents focus on priority or baseline indicators and measures for those indicators.
4:30 – 4:40	SHORT BREAK
4:40 - 5:15	6. Debrief and planning Share small breakout work with group. Day 1 check-in on progress- objectives being met
5:30 **7:00**	Return Downtown Meet for Social Hour (Location TBD) *Dinner is self-assembled. Restaurant recommendations will be provided.*

Wednesday	ACTIVITIES and OBJECTIVES
8:00	**Wednesday , March 9, 2011** **Please meet in lobby of Fulton Lane Inn to split into available vehicles. Travel to HML**
8:00 - 8:45	7. Check-in, Coffee and Tea
9:00 - 10:30	8. Large Group, Environmental conditions, lessons learned on developing indicators • Changing conditions in the Gulf of Mexico--Lori Schwacke, Center of Excellence in Oceans and Human Health at HML • Consider environmental changes related to the Deep Water Horizon disaster • Share any overnight insights and weigh in on priorities • Review previous work and hear lessons learned.
10:30 -11:00	BREAK

11:00 -12:15	9. Small Breakout Groups: Finalize suite of important indicators and measures Link indicators to environmental changes and ecosystem services
12:15 - 1:15	LUNCH – Catered lunch boxes, walk to picnic area on Charleston Harbor
1:15 - 2:15	10. Large Group • Report back on results from small groups • Discuss agency use of indicators **Objective:** Workshop constituents will design integration of indicators for well-being conceptual model and index.
2:15 - 2:30	**BREAK**
2:30 - 4:00	**11. Large Group** • Development of one framework that merges the best of all • Discuss uses for model • Discuss future activities
4:00 - 4:30	12. Summary and next steps with constituents • Summary and wrap-up
4:40 - 6:00	Return Downtown Optional tour of Hollings Marine Laboratory with return downtown Optional beach trip with return downtown *Dinner is self-assembled. Restaurant recommendations will be provided.*

Appendix C: Key Reference Terms and Overview Presentation

Indicators of Community Well-being Workshop: Gulf Coast Counties in the Wake of the Deepwater Horizon Industrial Disaster

Key Terms and Definitions

Below is a short list of terms commonly used by social scientists and others when theorizing, investigating or discussing social processes, institutions and phenomena, including some related specifically to the relationship between people and the natural environment. However, these terms are often used to represent a diversity of concepts and ideas. Therefore, in an effort to reduce confusion, we propose working definitions to be used during the workshop. We hope that these definitions may serve as an agreed-upon conceptual foundation for our work.

Well-being
Well-being is utilized as a measure of quality of life in many countries, cities, and localities and is typically broken into components related to economics, environment, basic human needs and the subjective well-being of people. Many definitions of well-being include the following key components: basic material needs, freedom, health, good social relations, and personal security (see MEA 2005).

A distinction is often made between basic human needs and subjective well-being. Basic human needs are things that are required for survival. Subjective well being encompasses more, by including those things that are not necessary for survival, but are important to a positive emotional and psychological sense of life.

Resilience
Resilience refers to the ability of a system (community, ecosystem, etc.) to bounce back following disturbances (see Holling 1973, Pimm 1984).

Vulnerability
Vulnerability refers to the potential for loss or damage that results from exposure to risk, shock, or some other stressor (see Mitchell 1989, Gunderson et al.. 1995).

Social Capital
Social capital refers to the structure of relations between and among individuals that encourages productive activities within a social group (see Coleman 1988, Pretty and Ward 2001).

Community Capacity

Community capacity is a multidimensional concept that includes participation and leadership, skills, resources, social and inter-organizational networks, sense of community, understanding of community history, community power, community values, and on-going evaluation (see Goodman et al.. 1998).

Disaster
Disasters are often categorized as either natural disasters (e.g., floods, hurricanes, tornadoes or earthquakes) or technological disasters (e.g., oil spills, infrastructure failure or bio-terrorism). Surveillance and mitigation efforts are needed to help lessen the impact of both types of disasters. The term technological disaster encompasses industrial accidents and man-made disasters.

Ecosystem Services
Ecosystem services can be thought of as all benefits that humans derive from the ecosystems.
These services are critical to the well-being and health of people. Not only do they provide life's basic needs, but changes in their flow impact economic conditions, movement of people, and security. As a result, such changes have wide-ranging impacts on well-being and health. Our primary reference document for the linkages between ecosystem services and human health and well-being is the Millennium Ecosystem Assessment (see MEA 2005).

Baseline
A baseline serves as a value or quantity that is used by researchers to compare with later measurements or assessments. The baseline serves as a point of reference that allows for measurement of change over time.

Domains or Categories
Domains are broad categories or fields of action within which a variety of indicators may be grouped.

Indicator
Social indicators should be an aid in describing changing social conditions and should have an explanatory or theoretical function; e.g., access to recreational opportunities may be an indicator, whereas the number of parks within a county may serve as a measure of this indicator. The idea of social indicators is closely linked with the idea of monitoring social change in order to introduce a policy intervention, when possible (see Duncan 1974).

Measure
The quantification of an indicator; e.g., the number of grocery stores in a neighborhood may be a measure of the indicator, access to food.

Conceptual model/framework
A depiction of the relationships between indicators (may include direction, strength, etc.)

Index
An index is the aggregation of several component indicators.

Level/Scale
Level or scale may be used to refer to both measurement (e.g., nominal, ordinal, continuous) and units of analysis (e.g., household, county, state, region, nation, ecosystem, watershed).

References
Coleman, J. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* Supplement 94: S95-S120.

Duncan, O.D. 1974. “Developing Social Indicators (social change/social accounting/social statistics/social reporting/social forecasting).” *Proceedings of the National Academy of Sciences, USA* 71(12): 5096-5102.

Goodman, R.M., M.A. Speers, K. McLeroy, S. Fawcett, M. Kegler, E. Parker, S.R. Smith, T.D. Sterling, and N. Wallerstein. 1998. “Identifying and Defining the Dimensions of Community Capacity to Provide a Basis for Measurement.” *Health Education and Behavior* 25(3): 258-278.

Gunderson, L.H., C.S. Holling, S.S. Light, Eds. 1995. *Barriers & Bridges for the Renewal of Ecosystems and Institutions*. New York, NY: Columbia University Press.
Holling, C.S. 1973. “Resilience and Stability of Ecological Systems.” *Annual Review of Ecology and Systematics* 4: 1-23.

[MEA] Millennium Ecosystem Assessment. 2005. Millennium Ecosystem Assessment Synthesis Report. Washington, DC: Island Press.

Mitchell, J.K. 1989. “Hazards research.” Pp. 410-424 in G.L. Gaile and C.J. Willmott, Eds., *Geography in America*. Colombus, OH: Merill.

Pimm, S.L. 1984. “The complexity and stability of ecosystems.” *Nature* 307: 322-326.

Pretty, J. and H. Ward. 2001. “Social Capital and the Environment.” *World Development* 29(2): 209-227.

Appendix D: Selected References

Indicators of Community Well-being Workshop:
Gulf Coast Counties in the Wake of the Deepwater Horizon Industrial Disaster
A Collection of Relevant References

Prior to the workshop, participants were asked to provide organizers with relevant literature and citations to support efforts during and after the workshop. The suggested references are below.

References

Aguilera, Francisco, et al.. 2010. Review on the Effects of Exposure to Spilled Oils on Human Health. *Journal of Applied Toxicology* 30: 291-301.

Arata, Catalina M., J. Steven Picou and G. David Johnson. 2000. Coping with Technological Disaster: An Application of the Conservation of Resources Model to the Exxon Valdez Oil Spill. *Journal of Traumatic Stress* 13(1):23-39.

Aratame, N. and J. Singelmann. 2002. Socioeconomic Baseline Study for the Gulf of Mexico. Final Report: A Description of the Dataset, 1930-1990. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2002-054. 146 pp. Australian Unity Wellbeing Index 17.2, Deakin University, Geelong, Victoria 3217, Australia.

Bach, Robert, Robert Doran, Laura Gibb, David Kaufman, and Kathy Settle. 2010. *Policy Challenges in Supporting Community Resilience*. Presented initially at the London Workshop of the Multinational Community Resilience Policy Group, November 4-5, 2010. The Group is co-chaired by David Kaufman, Federal Emergency Management Agency, Department of Homeland Security, United States, and Kathy Settle, Civil Contingencies Secretariat, Cabinet Office, United Kingdom.

Baker, Justin, Shaw, W.D., Bell, D., Brody, S.D., Neilson, W. 2009. Explaining Subjective Risks of Hurricanes and the Role of Risks in Intended Moving and Location Choice Models. *Natural Hazards Review* 10(3): 102-112.

Beatley, Timothy. 2009. *Planning for Coastal Resilience: Best Practices for Calamitous Times.* Washington, D.C.: Island Press, 2009

Bevc, C. A., B. K. Marshall, et al.. 2007. Environmental Justice and Toxic Exposure: Toward a Spatial Model of Physical Health and Psychological Well-Being. *Social Science Research* 36 (1): 48-67.

Blanchard, et al.. 2010. *Tracking Community Resilience in the Wake of the Deepwater Horizon Disaster: Developing Infrastructure for Analyzing the Human Impact on Coastal Communities.* Project Proposal, Public Version.

Blanchard, et al.. 2010. *Tracking Community Resilience in the Wake of the Deepwater Horizon Disaster: Developing Infrastructure for Analyzing the Human Impact on Coastal Communities.*
LSU Gulf Oil Spill Survey, 2010: Wave 2.

Bobbitt, Linda, et al.. 2005. The Development of a County Level Index of Well-Being. *Social Indicators Research* 73(1): 19-42.

Bowen, Robert E. and Cory Riley. 2003. Socio-economic Indicators and Integrated Coastal Management. *Ocean & Coastal Management* 46: 299–312.

Brody, S.D., Kang, Jung Eun, Bernhardt, S.P. 2010. Identifying Factors Influencing Flood Mitigation at the Local Level in Texas and Florida: the Role of Organizational Capacity. *Natural Hazards* 52:167–184, DOI 10.1007/s11069-009-9364-5.

Brody, S.D., Zahran, S., Maghelal, P., Grover, H., and Highfield, W. 2007. The rising costs of floods: Examining the impact of planning and development decisions on property damage in Florida. *Journal of the American Planning Association* 73(3): 330-345.

Brody, S.D., Himanshu Grover, Sara Bernhardt, Zhenghong Tang, Bianca Whitaker, and Colin Spencer. 2006. A Multi-Criteria, Spatial Site Suitability Analysis for Oil and Gas Exploration in Texas State Coastal Waters. *Environmental Management* 38:597–617.

Brody, S.D., Highfield, Wesley, Arlikatti, Sudha, Bierling, David, Ismailova, Roubabah, Lee, Lai, and Butzler, Rachel. 2004. Mapping Conflict on the Coast: Using Geographic Information Systems to Locate Potential Environmental Disputes in Matagorda Bay, TX. *Environmental Management* 34(1): 11-25.

Brody, S.D. 2003. Measuring the Effects of Stakeholder Participation on the Quality of Local Plans Based on the Principles of Collaborative Ecosystem Management. *Journal of Planning and Education Research* 22(4): 107-119.

Brody, S.D. 2003. Are We Learning to Make Better Plans? A Longitudinal Analysis of Plan Quality Associated with Natural Hazards. *Journal of Planning and Education Research* 23(2): 191-201.

Brody, S.D., Highfield, W.E., Kang, J.E. (In Press). *Rising Waters: Causes and consequences of flooding in the United States*. Cambridge, UK: Cambridge University Press.

Brody, S.D. (In press). Land Use Change and Increased Vulnerability. In *Severe Storm Prediction, Impact and Recovery on the Texas Gulf Coast*. Bedient et al.. (eds). TX A&M University Press: College Station, TX.

Building Community Disaster Resilience through Private-Public Collaboration. 2010. Committee on Private-Public Sector Collaboration to Enhance Community Disaster Resilience, Geographical Science Committee, National Research Council. The National Academies Press, Washington, DC.

Burd-Sharps, Sarah, Kristen Lewis, and Eduardo Borges Martins. 2009. *A Portrait Of Louisiana: Louisiana Human Development Report 2009*. American Human Development Project of the Social Science Research Council, Commissioned by Oxfam America and the Louisiana Disaster Recovery Foundation.

Castanedo, S., et al.. 2009. Oil Spill Vulnerability Assessment Integrating Pysical, Biological and Socio-economic Aspects: Application to the Cantabarian Coast (Bay of Biscay, Spain). *Journal of Environmental Management* 91: 149-159.

Center for Disease Control, N. E. P. H. T. 2009, July 13. National Enviornmental Public Health Tracking, Background. Available Online: http://www.cdc.gov/nceh/tracking/background.htm Retrieved on June 29, 2010.

Chandra, Anita, Joie Acosta, Stefanie Stern, Lori Uscher-Pines, Malcolm V. Williams, Douglas Yeung, Jeffrey Garnett, and Lisa S. Meredith. 2011. *Building Community Resilience to Disasters: A Way Forward to Enhance National Health Security*. RAND Technical Report. Sponsored by the U.S. Department of Health and Human Services.

Cooper, John, and Jasmine Waddell. 2010. Impact of Climate Change on Response Providers and Socially Vulnerable Communities in the US, *Oxfam America Research Backgrounder* series (2010): oxfamamerica.org/publications/us-climate-change-impact.

Cornelisse-Vermaat, Judith R., et al.. 2006. Body Mass Index, Perceived Health, and Happiness: Their Determinants and Structural Relationships. *Social Indicators Research* 79(1): 143-158.

Costanza, Robert, et al.. 2007. Quality of Life: An Approach Integrating Opportunities, Human Needs and Subjective Well-being. *Ecological Economics* 61: 267-276.

Cutter, Susan L, Christopher G. Burton, and Christopher T. Emrich. 2010. Disaster Resilience Indicators for Benchmarking Baseline Conditions. *Journal of Homeland Security and Emergency Management*. 7(1): Article 51.

Cutter, Susan L, Christopher T. Emrich, Jennifer J. Webb, and Daniel Morath. 2009. *Social Vulnerability to Climate Variability Hazards: A Review of the Literature*. Final Report to Oxfam America.

Dyer, Christopher, et al.. 1992. Social Disruption and the Valdez Oil Spill: Alaskan Natives in a Natural Resource Community. *Sociological Spectrum* 12: 105-126.

Emmer, Rod, LaDon Swann, Melissa Schneider, Stephen Sempier, Tracie Sempier, and Tina Sanchez. 2008. *Coastal Resiliency Index: A Community Self-Assessment A Guide to Examining How Prepared Your Community Is for a Disaster.* NOAA Sea Grant Louisiana and NOAA Sea Grant Mississippi.

Fall, James A., et al.. 2001. Long-term Consequences of the Exxon Valdez Oil Spill for Coastal Communities of Southcentral Alaska. Technical Paper No. 264. Juneau, AK: Division of Subsistence, Alaska Department of Fish and Game.

Flowers, J., P. Hall, et al.. 2005. Mini-symposium--Public Health Observatories: Public health Indicators. *Public Health* 119(4): 239-245.

Freudenburg, William. R.1997. 1997 Contamination, Corrosion and the Social Order: An Overview. *Current Sociology* 45(3): 19-40.

Gill, Duane A. and J. Steven Picou. 1998. Technological Disaster and Chronic Community Stress. *Society & Natural Resources* 11:795-815.

Godschalk, D., Brody, S.D., & Burby, R. (2003). Public Participation in Natural Hazard Mitigation Policy Formation: Challenges for Comprehensive Planning. *Journal of Environmental Planning and Management* 46(5): 733-754.

Goidel, Kirby and Ashley Kirzinger. 2010. *The View from the Coast: A Survey of 924 Coastal Residents on the 2010 Gulf Oil Spill.* Reily Center for Media and Public Affairs, Manship School of Mass Communication, Louisiana State University.

Hagerty, Michael R., et al.. 2001. Quality of Life Indexes for National Policy: Review and Agenda for Research. *Social Indicators Research* 55(1): 1-96.

Hahn, D. 2010. How to create a public-private partnership: A replicable project associated with business continuity. *Journal of Business Continuity & Emergency Planning. 4* (3), 274-285

Highfield, Wesley E. and Samuel D. Brody. (2006). The Price of Permits: Measuring the Economic Impacts of Wetland Development on Flood Damages in Florida. *Natural Hazards Review* 7(3): 23-30.

Hill, Edward W. (Ned), Howard Wial, and Harold Wolman. 2008. *Exploring Regional Economic Resilience*. Prepared for presentation at the annual meeting of the Urban Affairs Association,April 2008.

Jacob, Steve, Priscilla Weeks, Benjamin G. Blount, and Michael Jepson. 2010. Exploring Fishing Dependence In Gulf Coast Communities. *Marine Policy*. 34: 1307–1314.

Jepson, Michael and Steve Jacob. 2007. Social Indicators and Measurements of Vulnerability for Gulf Coast Fishing Communities. American Anthropological Association, *NAPA Bulletin* 28: 57-68.

Kahan, Jerome H, Andrew C. Alleny, and Justin K. Georgez. 2009. An Operational Framework for Resilience. *Journal of Homeland Security and Emergency Management*. 6(1): Article 83.

Keeney, Ralph L. and Robin S. Gregory. Selecting Attributes to Measure the Achievement of Objectives. *Operations Research*. 53(1): 1–11.

Klazinga N, et al.. 2001. Indicators Without a Cause: Reflections on the Development and Use of Indicators in Health Care From a Public Health Perspective. *International Journal for Quality in Health Care* 13(6):433-8.

The LSU Post-Katrina Community Recovery Survey. 2010. Louisiana State University, College of Arts & Sciences, Department of Sociology.

Lee, Matthew R and Troy C. Blanchard. 2010. *Health Impacts of Deepwater Horizon Oil Disaster on Coastal Louisiana Residents.* Louisiana State University.

Loomis, D.K., Poole, B.D., and Paterson, S.K. 2009. *Using Onsite and Internet Surveys to Assess the Social Impacts of Coastal Restoration*. Series #09-02 Paper. Restore America's Estuaries. Arlington, VA. 30 pp.

Magis, Kristen. 2010. Community Resilience: An Indicator of Social Sustainability. *Society and Natural Resources*. 23:401–416.

McKay, S. Kyle, Bruce A. Pruitt, Mark Harberg, Alan P. Covich, Melissa A. Kenney, and J. Craig Fischenich. 2010. Metric Development for Environmental Benefits Analysis. *ERDC TN-EMRRP-EBA (4)*, July 2010.

Michalos, Alex C, Andrew Sharpe, Jean_Francois Arsenault, Nazeem Muhajarine, Ronald Labonte, Katherine Scott, Malcolm Shookner, Kelley Moore, Lenore Swystun, Bill Holden, Heather Bernardin, Beth Dunning, Paul Graham, and Linda Rattie. *An Approach to the Canadian Index of Wellbeing: A Report of the Canadian Index of Wellbeing (CIW).*

New Zealand Quality of Life Project. 2007. Quality of Life ’07: In Twelve New Zealand Cities. Available Online: http://www.bigcities.govt.nz/pdfs/2007/Quality_of_Life_2007.pdf Retrieved on March 1, 2011.

Norris, Fran H., Susan P. Stevens, Betty Pfefferbaum, Karen F. Wyche, and Rose L. Pfefferbaum. 2007. Community Resilience as a Metaphor, Theory, Set of Capacities and Strategy for Disaster Readiness. *American Journal of Community Psychology*. 41:127–150

Oxfam America. 2009. *State comparisons on social vulnerability and hazard exposure.*

Oxfam America. 2009. *Exposed: Social vulnerability and climate change in the US Southeast*.

Palinkas, Lawrence A. et al.. 1993. Social, Cultural, and Psychological Impacts of the Exxon Valdez Oil Spill. *Human Organization* 52(1): 1-13.

Peacock, Walt, Samuel D. Brody, William A. Seitz, William J. Merrell, Arnold Vedlitz, Sammy Zahran, Robert C. Harriss, and Robert R. Stickney. 2010. Advancing the Resilience of Coastal Localities: Developing, Implementing and Sustaining the Use of Coastal Resilience Indicators. Final Report for NOAA CSC Grant: NA07NOS4730147.

Picou, J. Steven, et al.. 1992. Disruption and Stress in an Alaskan Fishing Community: Initial and Continuing Impacts of the Exxon Valdez Oil Spill. *Industrial Crisis Quarterly* 6: 235-257.

Picou, J. Steven, B. K. Marshall, and D. A Gill. 2004. Disaster, litigation and the corrosive community. *Social Forces*, *82*(4):1493-1522.

Picou, J. Steven et al.. 2009. Community Impacts of the Exxon Valdez Oil Spill: A Synthesis and Elaboration of Social Science Research. Chapter 9 in *Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska*, Stephen R. Braund and Jack Kruse, Eds. MMS OCS Study Number 2009-006. Anchorage, AK: Stephen R. Braund & Associated.

Pollnac,Richard B, Susan Abbott-Jamieson, Courtland Smith, Marc L. Miller, Patricia M. Clay, and Bryan Oles. 2006. Toward a Model for Fisheries Social Impact Assessment. *Marine Fisheries Review*. 68(1-4):1-18.

Pollnac, Richard B, and B.R. Crawford. 2000. *Assessing Behavioral Aspects of Coastal Resource Use.* Proyek Pesisir Publications Special Report. Coastal Resources Center Coastal Management Report #2226. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island. 139 pp.

Pollnac, Richard B. 1998. *Rapid Assessment of Management Parameters for Coral Reefs***.** Coastal Resources Center, Coastal Management Report #2205 and ICLARM

Contribution #1445. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Prescott-Allen, Robert. 2006. *Culture & the Wellbeing Index: Measuring wellbeing and the contribution of culture*. Open Forum: Measuring Creativity, Happiness and Wellbeing, November 2006, Hong Kong Academy of Performing Arts, Hong Kong SAR.

Prescott-Allen, Robert. 2005. *Coast Information Team: Review Report*, 37 pp. Available online: http://www.citbc.org/c-citreview-jan05.pdf Retrieved March 1, 2011.

Rodin, Mari et al.. 1992. Community Impacts Resulting from the Exxon Valdez Oil Spill. *Industrial Crisis Quarterly* 6: 219-234.

Salz, R.J. and Loomis, D.K. 2005. Human Dimensions of Coastal Restoration. In *Science Based Restoration Monitoring of Coastal Habitats*. Thayer, Gordon W., McTigue, Teresa A., Salz, Ronald J., Merkey, David H., Burrows, Felicity M., and Perry F. Gayaldo, (eds.). Decision Analysis Series No. 23. (pgs. 14.1 – 14.67). Available Online: See Chapter 14, http://coastalscience.noaa.gov/ecosystems/estuaries/restoration_monitoring.aspx

Sempier, T.T., D.L. Swann, R. Emmer, S.H. Sempier, and M. Schneider. 2010. *Coastal Community Resilience Index: A Community Self-Assessment*. MASGP-08-014.

Spiegel, J. and A. Yassi 1997. The Use of Health Indicators in Environmental Assessment. *Journal of Medical Systems* 21(5): 275-289.

Sturtevant, V.S. and E.M. Donoghue. 2008. Social assessment of forest communities: For whom and for what? In: Donoghue, E.M. and V.S. Sturtevant, eds. *Forest community connections: Implications for research, management, and governance*. Washington, D.C.: Resources for the Future, 27-44.

Tran, et al.. 2004. Identifying Priority Health Conditions, Environmental Data, and Infrastructure Needs: A Synopsis of the Pew Environmental Health Tracking Project. *Environmental Health Perspectives* 112(14): 1414-1418.

Tolbert, C.M. II, ed. 2006 Sustainable community in oil and gas country: Final report. U.S.Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2006-011. 76 pp.

United Nations Environmental Programme. 2006. *Marine and Coastal Ecosystems and Human Wellbeing: A Synthesis Report Based on the Findings of the Millennium Ecosystem Assessment*. UNEP. 76pp.

Ursano, Robert J. et al.. 2007. Individual and Community Responses to Disasters. Chapter 1 in *Textbook of Disaster Psychiatry*, Robert J. Ursano, Carol S. Fullerton, Lars Weisaeth, and Beverley Raphael, Eds. London: Cambridge University Press.

United States Indian Ocean Tsunami Warning System Program. 2007. *How Resilient is Your Coastal Community? A Guide for Evaluating Coastal Community Resilience to Tsunamis and Other Coastal Hazards*. U.S. Indian Ocean Tsunami Warning System Program supported by the United States Agency for International Development and partners, Bangkok, Thailand.

Webler, Thomas & Fabienne Lord. 2010. Planning for the Human Dimensions of Oil Spills and Spill Response. *Environmental Management* 45:723–738.

Weil, Frederick. 2010. Recovery To Transformation Of A Great American City The Rise Of Community Engagement After Katrina. *The New Orleans Index at Five: Reviewing Key Reforms After Hurricane Katrina*. August 2010.

Witters, Dan. 2010. Gulf Coast Residents Worse Off Emotionally After BP Oil Spill: Depression diagnoses, daily stress and worry all increase for Gulf residents. *Gallup*. September 28, 2010. Retrieved on March 4, 2011. http://www.gallup.com/poll/143240/gulf-coast-residents-worse-off-emotionally-oil-spill.aspx

World Health Organization. 2005. *Ecosystems and Human Well-Being: Synthesis, A Report of the Millennium Ecosystem Assessment*. 137pp.

World Health Organization. 2005. *Ecosystems and Human Well-Being: Health Synthesis, A Report of the Millennium Ecosystem Assessment*. 64pp.

World Resources Institute. 2003. *Ecosystems and Human Well-being: A Report of the Conceptual Framework Working Group of the Millennium Ecosystem Assessment*. Island Press, Washington, DC.

Zahran, S., Brody, S.D., Highfield, W., Vedlitz, A. 2010. Nonlinear Incentives, Plan Design, and Flood Mitigation: The Case of the Federal Emergency Management Agency's Community Rating System. *Journal of Environmental Planning and Management* 53(2): 219-239.

Zahran, S., Weiler, S., Brody, S., Lindell, M., Highfield, W. (2009). Modeling National Flood Insurance Policy Holding at the County Scale in Florida, 1999-2005. *Journal of Ecological Economics* 68(10): 2627-2636.

Zahran, S., Shelly, T., Peek, L., Brody, S.D. 2009. Natural Disasters and Social Order: Modeling Crime Outcomes in Florida. *International Journal of Mass Emergencies and Disasters* 27(1): 26-52.

Zahran, S., Brody, S.D., Peacock, W.G., and Vedlitz, A., Grover, H. 2008. Social Vulnerability and The Natural and Built Environment: A Model of Flood Casualties in Texas, 1997-2001. *Disasters* 32(4): 537-60.

Appendix E: Workshop Evaluation Key Results

Indicators of Community Well-being Workshop:
Gulf Coast Counties in the Wake of the Deepwater Horizon Industrial Disaster
Workshop Evaluation, Key Results

As a final activity of the workshop, participants were asked to provide their feedback to improve future workshops. Key results of this feedback are presented below.

Question	Mode
How well were the following objectives met? I know more about…	
Indicator and index work conducted by others	4
Indentifying and describing a common set of indicators of well-being	4
The complexities of developing a framework of indicators	4
How effective was the overall structure and process of the workshop? Please rank the following activities for effectiveness…	
Presentations	5
Large group discussions	4
Small group discussions	5
In answering the open-ended question "*What did you like best about this workshop?*" 75% of the workshop participants included that what they liked the most about the workshop experience was the opportunity to interact with and learn from a diverse group of colleagues and experts.	

United States Department of Commerce

John Bryson
Secretary

National Oceanic and Atmospheric Administration

Jane Lubchenco
Under Secretary of Commerce for Oceans and Atmospheres

National Ocean Service

David Kennedy
Assistant Administrator for Ocean Service and Coastal Zone Management